

Citrus pests

a field guide



a companion to
Citrus pests and their natural enemies
INTEGRATED PEST MANAGEMENT IN AUSTRALIA

Information Series
QI97092

Citrus pests

a field guide



a companion to
Citrus pests and their natural enemies
INTEGRATED PEST MANAGEMENT IN AUSTRALIA

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Disclaimer

The information in this book was the best available at the time of publication. However, integrated pest management is a dynamic and growing field, and readers should seek professional advice on developments since publication, particularly on monitoring.

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Funds to produce the field guide were provided by HRDC, and Australian citrus growers. Without this funding, the field guide could not have been published.

The editors thank everyone who contributed to the field guide. We particularly pay tribute to the quality of the photographs, which are a major feature. There are over 200 colour plates illustrating insect and mite pests, and some of their major natural enemies. Chris Freebairn contributed the majority of these photographs, with other significant contributions from Dan Smith, Dan Papacek, and David Ironside.

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Concepts of integrated pest management (IPM)

Integrated pest management (IPM) is a strategy which encourages the reduction of pesticide use by using a variety of controls in harmonious combination to contain or manage pests below their economic injury levels. The aim is to produce quality fruit at minimal cost by intelligently managing pests.

IPM is the complete opposite of relying solely on pesticides to control pests (and diseases). It aims to maximise the use of biological and cultural controls, and other measures, such as chemical control, must play a supportive rather than disruptive role.

Pesticides should be used strictly when needed, as determined by systematic monitoring of pests and their natural enemies. Selective, non-disruptive chemicals are preferred over broad-spectrum ones such as organophosphates, carbamates and synthetic pyrethroids, which are very harmful to natural enemies of pests.

Components of IPM

Several important components make up a practical IPM program. These include:

- identification of pests and their natural enemies
- monitoring of pests and their natural enemies
- data recording and reporting
- decision making

- taking appropriate action to manage pests
- reappraisal and research.

Advantages of IPM

The adoption of IPM can result in production of high-quality fruit at less cost to the grower than the cost of chemical control programs. There are also potential marketing advantages for 'clean and green' citrus produced with minimal pesticide use.

Other advantages of IPM are:

- the development of pest resistance to pesticides is delayed or avoided due to the infrequent use of chemicals
- growers develop a thorough knowledge of pests and their natural enemies, and can use this to improve orchard management
- long-term control of citrus pests is improved through the increased abundance and diversity of natural enemies present in the orchard
- as a result of reduced pesticide use, safety is improved for people working in orchards
- as a result of reduced pesticide use, environmental contamination is reduced
- pesticide residues in or on fruit are minimised, enhancing consumer acceptance of the produce.

How to use this field guide

This field guide has been produced as a companion to the much larger book *Citrus pests and their natural enemies: integrated pest management in Australia*. The larger book describes over 100 citrus pests and their natural enemies, and gives detailed information on the monitoring and management of pests in line with the principles of IPM (integrated pest management). It is illustrated with more than 400 colour photographs.

The field guide, on the other hand, summarises information on most of the pests and their major natural enemies, and is illustrated with over 200 colour photographs. It has been designed as a quick reference to be taken into the orchard and used to identify pests and the damage they cause. Page references are given to the relevant sections in *Citrus pests and their natural enemies*. There is also an index to the common and scientific names of pests and natural enemies.

The section on each pest tells the reader when orchards must be monitored for that pest. The information is in the following form, where the shaded boxes represent the months when monitoring must be carried out. (The months start with June in the first box on the left.)

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Brown citrus rust mite

Tegolophus australis

Pest size	0.18 mm
Importance	MAJOR Qld OCCASIONALLY IMPORTANT or MINOR other states
Distribution	All districts
Varieties attacked	All
Seasonal history	20–30 generations per year
Similar to	Citrus rust mite, citrus bud mite

Damage

Brown russetting of fruit and leaves; mite prefers exposed side of fruit and upper surface of leaves.

Similar to damage caused by citrus rust mite and broad mite.

Major natural enemies

Phytoseiid mites, e.g. *Euseius victoriensis*.

Action level

10% or more of fruit infested.

MONITORING

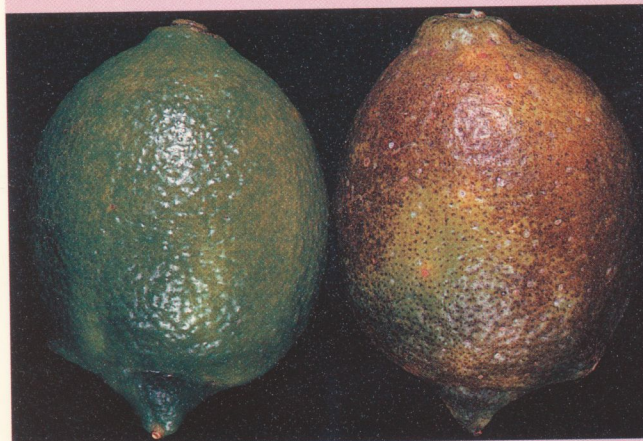
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2 Rind damage on a Valencia orange caused by brown citrus rust mite.



Brown citrus rust mite. Shown are light-brown, wedge-shaped adults, smaller, paler nymphs, and eggs (arrowed).



Rind damage on a young Lisbon lemon (right) caused by brown citrus rust mite. Compare with the undamaged fruit (left).

Citrus rust mite

Phyllocoptruta oleivora

Pest size	0.15 mm
Importance	MAJOR Qld, NSW OCCASIONALLY IMPORTANT or MINOR other states
Distribution	Most districts
Varieties attacked	All
Seasonal history	20–30 generations per year
Similar to	Brown citrus rust mite, citrus bud mite

Damage

Brown to black russetting of fruit and leaves; mite prefers sheltered side of fruit and lower leaf surface.

Similar to damage caused by brown citrus rust mite and broad mite.

Major natural enemies

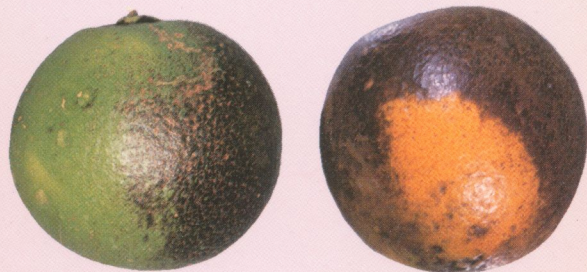
Phytoseiid mites, e.g. *Euseius elinae*, *Euseius victoriensis*, *Amblyseius herbicolus* and *Amblyseius lentiginosus*.

Action level

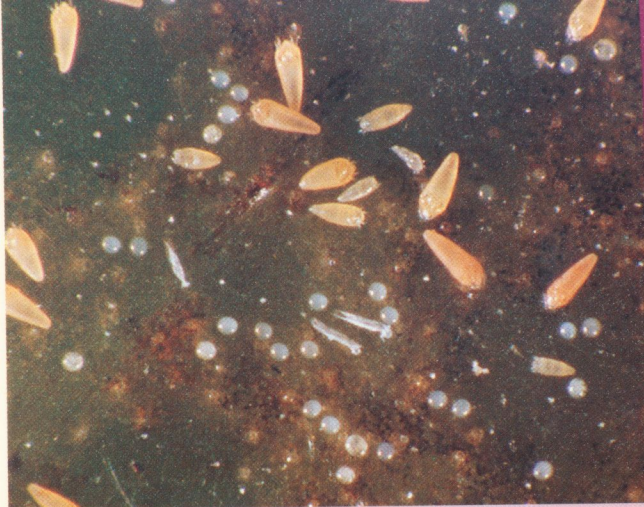
5–10% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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4 Citrus rust mite damage on the rind of Valencia oranges.



Citrus rust mite adults, nymphs and eggs.



Citrus rust mite damage on Valencia oranges on the tree. Note the range of colours of the damaged areas.

Citrus bud mite

Eriophyes sheldoni

Pest size 0.17 mm

Importance OCCASIONALLY IMPORTANT

Distribution Mainly Qld; also NSW, WA

Varieties attacked Particularly lemons, navel oranges, grapefruit

Seasonal history At least 20 generations per year

Similar to Brown citrus rust mite, citrus rust mite

Damage

Distortion of flowers, fruit and shoots; mites usually hidden inside leaf and flower buds.

Major natural enemies

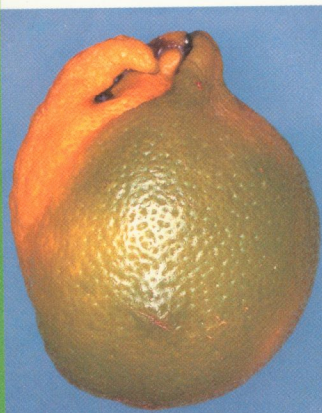
Phytoseiid mites, e.g. *Euseius victoriensis*.

Action level

10% or more of leaf buds infested.

MONITORING

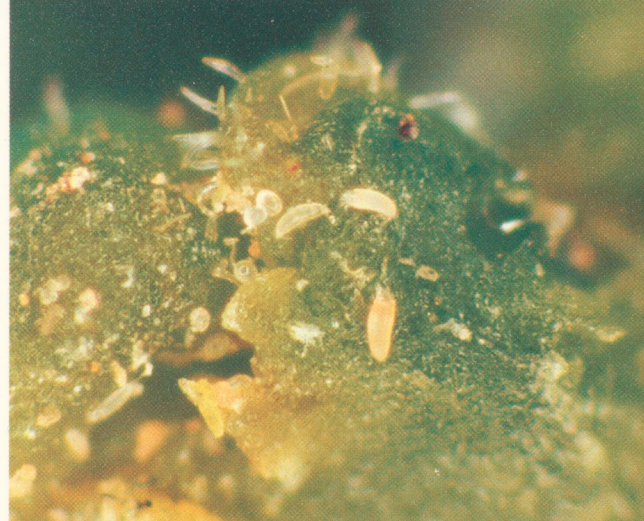
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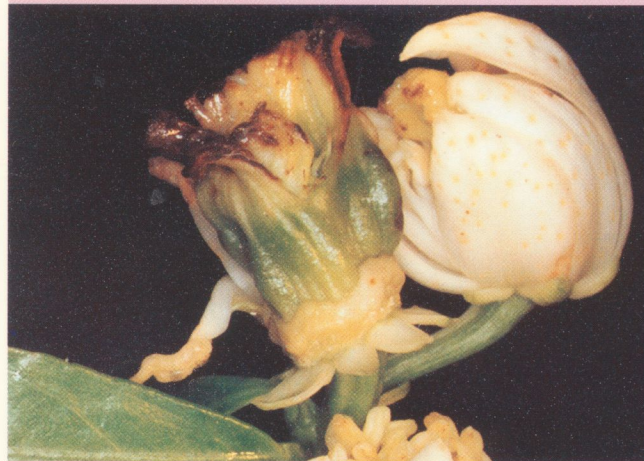
Distortion of a Lisbon lemon caused by citrus bud mite.



Distortion of grapefruit shoots caused by citrus bud mite.



Citrus bud mite adults, nymphs and eggs. These mites are very difficult to find without the aid of a microscope, as they are very small, white to cream, and hidden in buds.



Flower distortion caused by citrus bud mite.

Broad mite

Polyphagotarsonemus latus

Pest size 0.2 mm
Importance MAJOR Qld, northern NSW
MINOR WA

Distribution Qld, coastal NSW, WA

Varieties attacked Particularly lemons, Hickson mandarin, limes

Seasonal history 20–30 generations per year

Similar to Bdellid mites, which are not a pest

Damage

Grey 'sharkskin' on young fruit, twisting of leaves; mite prefers sheltered side of young fruit. Similar to damage caused by citrus rust mite and brown citrus rust mite.

Major natural enemies

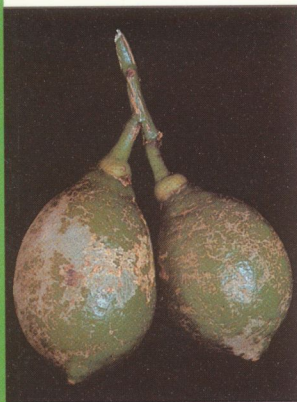
Phytoseiid mites, e.g. *Euseius victoriensis*, are important in subcoastal areas.

Action level

5% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Rind damage on young Lisbon lemons caused by broad mite. The silvery-grey areas are on the surfaces of the fruit that faced the inside of the tree.



Rind damage on grapefruit caused by broad mite.



Broad mite adults, nymphs and eggs. The adults are yellow, the nymphs white, and the surface of the eggs covered with white 'studs' (bottom right).



Bdellid mites (left) and broad mites (right). Bdellid mites are sometimes mistaken for broad mites. However, the bdellid male carries the pre-adult female lengthwise, while the male broad mite usually carries the pre-adult female crosswise.

Two-spotted mite

Tetranychus urticae

Pest size

0.5 mm

Importance

OCCASIONALLY IMPORTANT

Distribution

Most districts

Varieties attacked

All, but Meyer lemon most commonly infested in coastal areas

Seasonal history

10–20 generations per year

Similar to

Oriental spider mite

► Damage

Yellow stippling of leaves and fruit; mite prefers exposed fruit and upper leaf surface.

Similar to damage caused by oriental spider mite and citrus red mite.

► Major natural enemies

Stethorus ladybirds; phytoseiid mites.

► Action level

20% or more of fruit or leaves infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Leaf (above) damaged by two-spotted mite. Compare with the healthy leaf (below).

Stethorus ladybird, a predator of two-spotted mite, with some of its prey.



Two-spotted mite (right) and Chilean predatory mite (left).



Rind damage on Valencia orange caused by two-spotted mite. The rind is covered with pale spots.

Oriental spider mite

Eutetranychus orientalis

Pest size 0.5 mm

Importance **MAJOR** Emerald area
OCCASIONALLY IMPORTANT other areas

Distribution Qld

Varieties attacked All, but particularly Murcott and Imperial mandarins

Seasonal history 10–20 generations per year

Similar to Two-spotted mite

► **Damage**

Yellow stippling of leaves and fruit; mite prefers upper leaf surface.

Similar to damage caused by two-spotted and citrus red mites.

► **Major natural enemies**

Stethorus ladybirds; phytoseiid mites.

► **Action level**

20% or more of fruit or leaves infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Leaves damaged by oriental spider mite. Note pale, spotted appearance of the leaves.



Oriental spider mite. Left, male on top of darker female. Right, males clustering around a pre-adult female. Note the long legs on the males. Unhatched eggs are brownish, while hatched eggs are colourless and translucent. The white objects are shed skins.



Oriental spider mites and white shed skins on damaged leaf tissue. The damage shows as spotted, pale, discoloured areas.

Citrus red mite

Panonychus citri

- Pest size** 0.5 mm
Importance MINOR
Distribution Central coastal NSW
Varieties attacked All, but particularly oranges
Seasonal history 8–10 generations per year
Similar to Two-spotted mite and oriental spider mite, but citrus red mite is purple to red in colour.

Damage

Grey and yellow stippling of fruit and leaves; mite prefers upper surface of mature leaves.

Similar to damage caused by two-spotted mite and oriental spider mite.

Major natural enemies

Phytoseiid mites; stethorus ladybirds.

Action level

50% or more of leaves infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus flat mite

Brevipalpus lewisi

- Pest size** 0.3 mm
Importance MINOR
Distribution Qld, NSW, Vic, SA
Varieties attacked All, but particularly oranges
Seasonal history 6–8 generations per year
Similar to Oriental spider mite and citrus red mite, but citrus flat mite is flat in profile

Damage

Spotted grey scarring of fruit; mite prefers feeding on the fruit near or under the calyx and on the lower leaf surface.

Similar to damage caused by broad and two-spotted mites.

Major natural enemies

Phytoseiid mites.

Action level

20% or more of fruit infested.

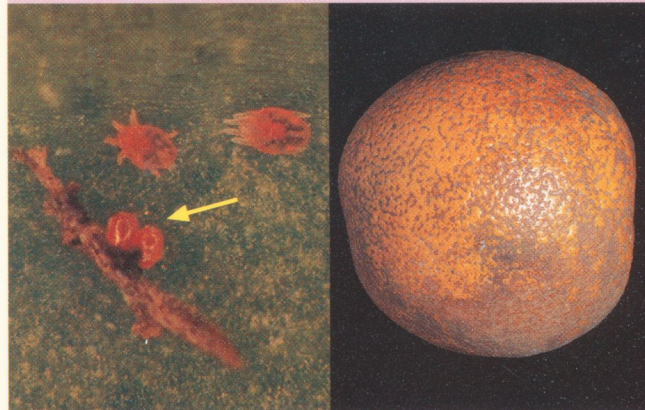
MONITORING

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Citrus red mite. Note the purple-red colour of the body, the pale legs, and the long white body bristles.

Pale stippling on leaf surface caused by citrus red mite.



Citrus flat mite. Note the red eggs (arrowed).

Spotted grey scarring of the rind of a Valencia orange caused by citrus flat mite.

Ants

Hymenoptera

Pest size	3–12 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	All districts
Varieties attacked	All
Seasonal history	Breed continually throughout the year
Similar to	Young assassin bug, a predatory bug

► Damage

No direct damage, but ants disrupt major natural enemies of other citrus pests, feeding on the honeydew produced by scales, mealybugs and aphids.

► Major natural enemies

Not significant.

► Action level

50% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Sooty mould on an orange. Soft scales, aphids, whiteflies, planthoppers and mealybugs produce honeydew on which the sooty mould fungus grows. Ants protect these pests, and therefore contribute to causing the sooty mould.



An ant searching for honeydew produced by green coffee scale.



An ant tapping hemispherical scale with its antennae. This induces the scale to produce honeydew.

Citricola scale

Coccus pseudomagnoliarum

Pest size 3–4 mm

Importance MAJOR, NSW, Vic
OCCASIONALLY IMPORTANT, SA, WA

Distribution NSW, Vic, SA, WA

Varieties attacked All

Seasonal history 1–2 generations per year

Similar to Soft brown and black scales, especially in young stages

Damage

Infests leaves and twigs, causing heavy sooty mould; commonly attended by ants.

Major natural enemies

Small parasitic wasps, e.g. *Coccophagus semicircularis*.

Action level

15 % or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citricola scale on leaf. Note the dorsal ridge running the whole length of the scale.



Citricola scale parasitised by a wasp *Coccophagus* sp.

Green coffee scale

Coccus viridis

Pest size 3–4 mm

Importance OCCASIONALLY IMPORTANT

Distribution Qld, coastal NSW

Varieties attacked All

Seasonal history 3–4 generations per year

Similar to Soft brown and long soft scales, especially in young stages

Damage

Infests leaves and twigs, causing heavy sooty mould; commonly attended by ants.

Major natural enemies

Small parasitic wasps or wasp parasites, e.g. *Coccophagus* sp.; the fungus *Verticillium lecanii*.

Action level

5% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Green coffee scale and associated sooty mould on leaves.

Parasitised green coffee scale. Note the pinkish orange larva of the parasite *Coccophagus near rusti*, which has been dissected out of the larger scale (centre). A parasite pupa is visible in the scale at the right. The smaller parasite *Encarsia* sp. is visible in the younger scales.



Green coffee scale along leaf midrib.



The fungus *Verticillium lecanii* on green coffee scale.

Soft brown scale

Coccus hesperidum

Pest size

3–4 mm

Importance

OCCASIONALLY IMPORTANT

Distribution

All districts

Varieties attacked

All

Seasonal history

2–5 generations per year

Similar to

Citricola, black, green coffee and hemispherical scales, especially in young stages

Damage

Infests leaves and twigs, causing heavy sooty mould; commonly attended by ants.

Major natural enemies

At least five important small parasitic wasps, including species of *Coccophagus*, *Metaphycus*, *Microterys* and *Diversinervus*.

Action level

15% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Young adult soft brown scale. Note the pale yellowish colour.

Diversinervus elegans, a wasp parasite of soft brown scale.



Soft brown scale on leaf.



Soft brown scale parasitised by the wasp *Metaphycus* sp. Note the three wasp pupae visible under the scale cover.

Long soft scale

Coccus longulus

Pest size	4–6 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	Qld, northern NSW
Varieties attacked	Mandarins, particularly Imperial, most affected
Seasonal history	4–6 generations per year
Similar to	Green coffee and soft brown scales, especially in young stages

Damage

Infests shoots and fruit stalks, causing heavy sooty mould.

Major natural enemies

The fungus *Verticillium lecanii*; small parasitic wasps.

Action level

5% or more of fruit stalks or water shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Black scale

Saissetia oleae

Pest size	3–5 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	All districts
Varieties attacked	All
Seasonal history	2–4 generations per year
Similar to	Citricola and soft brown scales, especially in young stages

Damage

Infests twigs, causing heavy sooty mould; settles first on leaves and then on twigs.

Major natural enemies

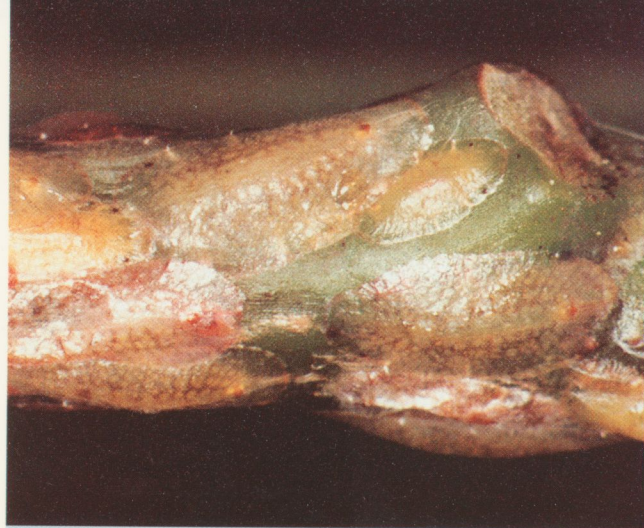
Small parasitic wasps *Metaphycus* spp. and *Scutellista caerulea*.

Action level

5–10% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Long soft scale adults and nymphs on fruit stalk.



Black scale on leaf midrib. Note the light-brown crawlers and the wasp *Scutellista caerulea* (top), a parasite as well as an egg predator.

Young adult black scale. Note the H-shaped ridge on the back.

Hemispherical scale

Saissetia coffeae

Pest size	2–4 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	Qld
Varieties attacked	All, particularly navels
Seasonal history	4–6 generations per year
Similar to	Soft brown and long soft scales, especially in young stages

Damage

Infests fruit stalks and green twigs, causing heavy sooty mould.

Major natural enemies

Small parasitic wasps, *Scutellista caerulea* and *Encyrtus infelix*; the fungus *Verticillium lecanii*.

Action level

5% or more of fruit stalks infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Nigra scale

Parasaissetia nigra

Pest size	3–4 mm
Importance	MINOR
Distribution	Qld
Varieties attacked	All
Seasonal history	5–6 generations per year
Similar to	Soft brown and long soft scale, especially in young stages

Damage

Infests leaves and fruit stalks, causing heavy sooty mould.

Major natural enemies

Small parasitic wasp *Scutellista caerulea*.

Action level

5% or more of fruit stalks infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult hemispherical scale on a fruit stalk.

Hemispherical scale, showing adults and juvenile stages, including crawlers. Young scale are lighter in colour than adults.



Adult and juvenile nigra scale on a twig.

Nigra scale parasitised by the wasp *Scutellista caerulea*. Note the hole through which an adult wasp has emerged (bottom left), the pupa under a scale cover (top left) and the pink, legless larva of a wasp (top right) which has been dissected out of a scale.

Cottony citrus scale (pulvinaria scale)

Pulvinaria polygonata

Pest size	3–5 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	SE Qld
Varieties attacked	All, particularly Meyer lemon
Seasonal history	2–3 generations per year
Similar to	Cottony cushion scale, especially in young stages

Damage

Infests leaves and twigs, causing heavy sooty mould.

Major natural enemies

Ladybirds, e.g. *Cryptolaemus montrouzieri* and *Halmus chalybeus*; the fungus *Verticillium lecanii*.

Action level

5% or more of leaves infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Pink wax scale

Ceroplastes rubens

Pest size	3–4 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	Qld, coastal NSW, WA
Varieties attacked	All varieties, particularly Emperor and Imperial mandarins
Seasonal history	1–2 generations per year
Similar to	Florida wax scale, hard wax scale

Damage

Infests leaves and twigs, causing heavy sooty mould.

Major natural enemies

The small wasp *Anicetus beneficus*.

Action level

5% or more of leaves infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Cottony citrus scale adults and juveniles on twig. Note the female with cottony egg mass (bottom left).

Predatory mealybug ladybird (*Cryptolaemus montrouzieri*), feeding on cottony citrus scale. Lower right, adult; upper left, larva.



Pink wax scale and wasp parasite *Anicetus beneficus*.

Sooty mould on leaves and fruit. The dark fungus grows on honeydew excreted by pink wax scales and other scales.

Florida wax scale

Ceroplastes floridensis

Pest size

2–4 mm

Importance

OCCASIONALLY IMPORTANT

Distribution

Qld

Varieties attacked

All, but particularly Meyer lemon and Valencia orange

Seasonal history

2 generations per year

Similar to

Pink wax scale, hard wax scale

► Damage

Infests leaves and twigs, causing heavy sooty mould.

► Major natural enemies

Small parasitic wasps, e.g. *Scutellista caerulea*; the fungus *Verticillium lecanii*.

► Action level

5% or more of leaves infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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White wax scale

Ceroplastes destructor

Pest size

6 mm

Importance

MINOR

Distribution

Qld, coastal and inland NSW, WA

Varieties attacked

All

Seasonal history

2 generations per year

Similar to

Pink wax scale, Florida wax scale, but wax is soft

► Damage

Infests twigs, causing heavy sooty mould.

► Major natural enemies

Small parasitic wasps, e.g. *Paracraeprocenus nyasicus*.

► Action level

5% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Florida wax scale on twig.



Adult white wax scale on twig.

Heavy infestation of white wax scale.

Hard wax scale (Chinese wax scale)

Ceroplastes sinensis

Pest size	6–7 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	NSW, WA
Varieties attacked	All
Seasonal history	1–2 generations per year
Similar to	Pink wax scale, Florida wax scale

► Damage

Infests leaves and twigs, causing heavy sooty mould.

► Major natural enemies

Small parasitic wasps *Tetrastichus ceroplastae* and *Scutellista caerulea*.

► Action level

5% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Cottony cushion scale

Icerya purchasi

Pest size	5 mm (10–15 mm with egg sac)
Importance	MINOR
Distribution	Most districts
Varieties attacked	All
Seasonal history	2 generations per year
Similar to	Cottony citrus scale

► Damage

Infests leaves and twigs, causing sooty mould.

► Major natural enemies

Ladybirds *Rodolia cardinalis*, *Cryptolaemus montrouzieri*; small parasitic fly *Cryptochetum iceryae*.

► Action level

5% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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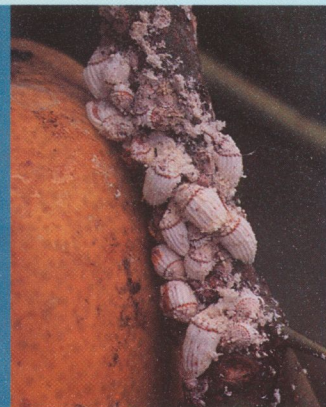
Mature hard wax scale on twig. Note the distinctive dirty-white colour.



Immature hard wax scales on twig. Immature scales are pink in autumn–winter.



Cottony cushion scale, with egg mass and crawlers.



Lemon twig infested with cottony cushion scale.

Red scale

Aonidiella aurantii

Pest size 2 mm

Importance MAJOR

Distribution All districts

Varieties attacked All

Seasonal history 2–6 generations per year

Similar to Yellow scale

Damage

Infests leaves, fruit, twigs, limbs.

Major natural enemies

Small, parasitic wasps *Aphytis melinus*, *Aphytis lingnanensis* (Qld), *Comperiella bifasciata*.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Red scale on Murcott mandarins.

Action level

10% or more of fruit (early varieties), or 15–20% or more of fruit (late varieties) infested.



Close-up of red scale on fruit, showing yellow crawlers (bottom left), white-capped first instars, older first instars, second instar males and females, and mature females.



The aphytis wasp *Aphytis lingnanensis*. Top, wasp feeding on red scale; centre, tapping scale with antennae before laying an egg; bottom, laying an egg on the body of an unmated adult female scale.

Pupae of three different aphytis wasps, showing their different pigmentation. Top, the pupa of *A. lingnanensis* has a large area of dark colouring; centre, the pupa of *A. melinus* has a small dark patch on the thorax; bottom, the pupa of *A. chrysomphali* has no dark pigmentation at all. The seed-like objects are faecal pellets.

Yellow scale

Aonidiella citrina

Pest size	2.5 mm
Importance	MINOR
Distribution	Vic, NSW, SA
Varieties attacked	All
Seasonal history	2–4 generations per year
Similar to	Red scale

Damage

Infests fruit and leaves, causing yellow spotting and leaf drop; mainly on leaves and on the inside of the tree.

Major natural enemies

The small wasp *Comperiella bifasciata* (yellow scale strain).

Action level

20% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Circular black scale (Florida red scale)

Chrysomphalus aonidum

Pest size	2 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All
Seasonal history	2–6 generations per year
Similar to	Red scale, but covering is dark red to black

Damage

Infests leaves and fruit, causing leaf drop and disfigurement.

Major natural enemies

The small wasp *Aphytis holoxanthus*.

Action level

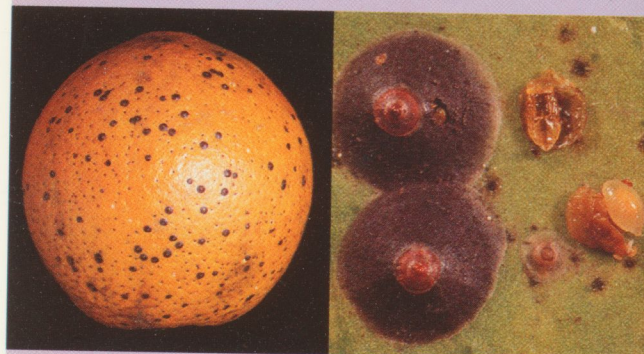
10% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Yellow scale. Lower left, second instars; centre left, male; right, adult females.



Circular black scale on an orange.

Adult female circular black scale (left), with larva (bottom right) and pupa (top right) of the wasp parasite *Aphytis holoxanthus*. Note the adult wasp chewing an emergence hole in the top scale. (Scale covers have been removed to show the larva and pupa.)

Citrus snow scale (white louse scale)

Unaspis citri

Pest size

White male 1 mm, brown female 2 mm

Importance

MAJOR

Distribution

Qld, coastal NSW

Varieties attacked

All

Seasonal history

3–6 generations per year

Similar to

Mussel scale, Glover's scale

Damage

Infests trunk, limbs, twigs, leaves and fruit.

Major natural enemies

The ladybird *Chilocorus circumdatus*.

Action level

Rating of scale infestation 2.5 or more.

MONITORING

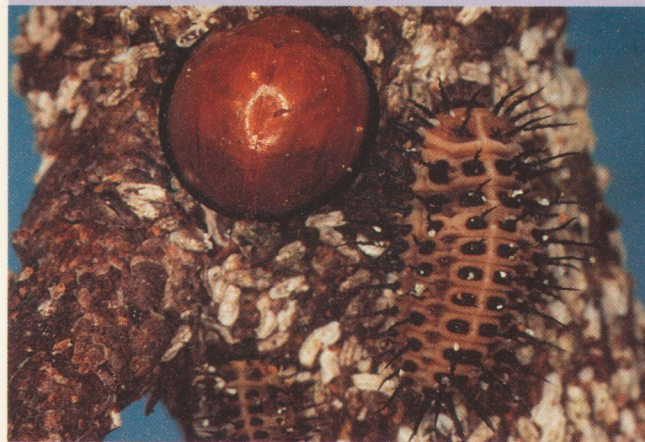
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Extensive splitting of the bark caused by a heavy infestation of citrus snow scale. Note the white speckled appearance of areas covered by male scales.



Citrus snow scale on twig. Note brown female and white male scales, crawlers, and wasp emergence holes in both male and female scales.



Chilocorus circumdatus larva and adult feeding on citrus snow scale.

Mussel (purple) scale

Lepidosaphes beckii

Pest size Female 3–4 mm
Importance OCCASIONALLY IMPORTANT
Distribution Qld, coastal NSW
Varieties attacked All
Seasonal history 2–6 generations per year
Similar to Citrus snow scale, Glover's scale

Damage

Infests twigs, leaves and fruit, causing disfigurement and dieback.

Major natural enemies

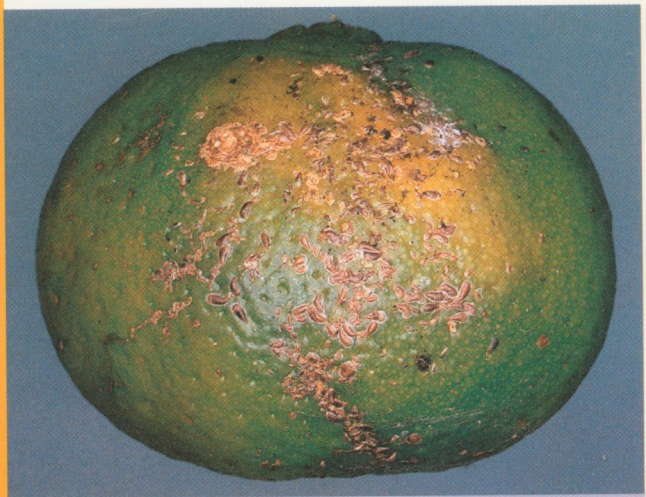
The small wasp *Aphytis lepidosaphes*.

Action level

20% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Mussel scale on a mandarin. This cluster of scales has gathered in the place where the fruit has been touching another fruit.



Mussel scale. Males are thin and females broad. Note the emergence holes made by the small parasitic wasp *Aphytis lepidosaphes*.



Mussel scale parasitised by the small parasitic wasp *Aphytis lepidosaphes*. Note the emergence holes and, in overturned scale covers, a pupa (left), and adult about to emerge (right).

Glover's scale

Lepidosaphes gloverii

Pest size	5–6 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All
Seasonal history	2–6 generations per year
Similar to	Citrus snow scale, mussel scale

Damage

Infests twigs, leaves and fruit, causing disfigurement and dieback.

Major natural enemies

The small parasitic wasp *Aphytis lepidosaphes*; the ladybird *Chilocorus circumdatus*.

Action level

20% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Chaff scale

Parlatoria pergandii

Pest size	1.5 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All
Seasonal history	5–6 generations per year
Similar to	Red scale, mussel scale

Damage

Infests twigs, leaves and fruit, causing disfigurement and dieback; trunk and limbs can be infested.

Major natural enemies

Small parasitic wasps *Aphytis* spp.; the ladybird *Chilocorus circumdatus*.

Action level

20% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Glover's scale on an orange.



Closeup of Glover's scale on fruit.



Chaff scale. Note the cheyletid mite (upper right) feeding on the egg from the purple adult female chaff scale (lower right). (The scale cover has been removed from this adult for the photograph.)

Citrophilous mealybug

Pseudococcus calceolariae

Pest size 3–4 mm

Importance **MAJOR** in some areas
OCCASIONALLY IMPORTANT in others

Distribution NSW, Vic, SA

Varieties attacked All, particularly navels and grapefruit

Seasonal history 3–4 generations per year

Similar to Longtailed mealybug, citrus mealybug

► Damage

Infests navel ends, under fruit buttons and between touching fruit and leaves, causing heavy sooty mould.

► Major natural enemies

Several small parasitic wasps, e.g. *Tetracnemoidea brevicornis* and *Anagrus fusciventris*; the mealybug ladybird (*Cryptolaemus montrouzieri*); lacewings.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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► Action level

10–20 % or more of the fruit of navels and grapefruit infested, 20% or more of other varieties infested.



Citrophilous mealybugs on fruit stalk.



The wasp *Tetracnemoidea brevicornis*, a parasite of citrophilous mealybug. Male (left), female (right). Note the branched antennae of the male.

Longtailed mealybug

Pseudococcus longispinus

Pest size 3–4 mm

Importance **MINOR**

Distribution Most districts

Varieties attacked All, particularly navels and grapefruit

Seasonal history 4–6 generations per year

Similar to Citrophilous mealybug, citrus mealybug

Damage

Infests navel ends, under fruit calyxes, between touching fruit and leaves; heavy sooty mould.

Major natural enemies

The parasitic wasp *Anagyrus fusciventris*; the ladybird *Cryptolaemus montrouzieri*.

Action level

10–20% or more of fruit of navels and grapefruit infested, 20% or more of other varieties.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus mealybug

Planococcus citri

Pest size 3 mm

Importance **MAJOR**

Distribution Most districts

Varieties attacked All, particularly navels and grapefruit

Seasonal history 4–6 generations per year

Similar to Citrophilous mealybug, longtailed mealybug

Damage

Infests navel ends, under calyxes, between touching fruit and leaves; heavy sooty mould.

Major natural enemies

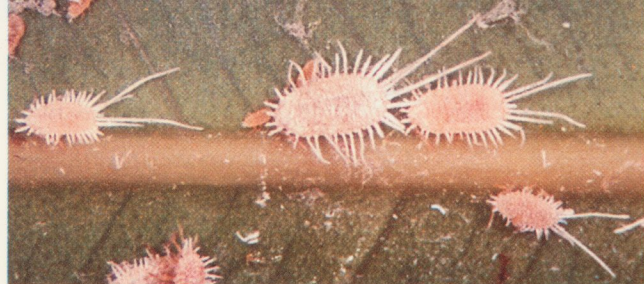
The parasitic wasp *Leptomastix dactylopii*; the ladybird *Cryptolaemus montrouzieri*; lacewings.

Action level

10% or more of fruit of navels and grapefruit infested, 20% or more of other varieties.

MONITORING

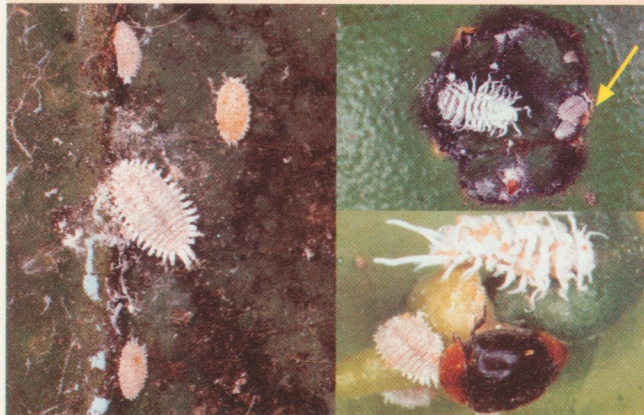
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Longtailed mealybugs on leaf.



Female of *Anagyrus fusciventris*, a wasp parasite of longtailed mealybug.



Citrus mealybugs on leaf.

Citrus mealybug in fruit navel (arrowed, top) and in calyx (bottom), with predatory larva of mealybug ladybird (top) and larva and adult (bottom).

Spherical mealybug

Nipaecoccus viridis

Pest size	2.5–4 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	North Qld
Varieties attacked	All
Seasonal history	6 generations per year
Similar to	Citrus mealybug

Damage

Infests leaves, shoots and fruit. There is a severe reaction resulting in twisting and deformity as well as production of sooty mould.

Major natural enemies

The small parasitic wasp *Anagrus agraeensis*; the mealybug ladybird (*Cryptolaemus montrouzieri*).

Action level

5% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Rastrococcus mealybug

Rastrococcus truncatispinus

Pest size	3–6 mm
Importance	MINOR
Distribution	Coastal NSW, SE Qld
Varieties attacked	All, particularly oranges and mandarins
Seasonal history	3–4 generations per year
Similar to	Longtailed mealybug

Damage

Infests leaves, causing sooty mould.

Major natural enemies

Not yet identified.

Action level

25% or more of leaves infested..

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Spherical mealybug female with her white, domed egg sac (top). Note the two red defensive droplets and the clear droplets of honeydew produced by this female. (Most species of mealybugs produce defensive droplets from excretory glands.) The white covering of the female at the bottom has been removed to show the purple body and purple eggs.

Leaf distortion caused by spherical mealybug. Note the mealybugs clustered on the twig.



Adult female rastrococcus mealybug. Note white, recently shed skin next to the mealybug.

Black citrus aphids

Toxoptera citricida, *Toxoptera aurantii*

Pest size 2 mm

Importance **MINOR**

Distribution All districts

Varieties attacked All

Seasonal history 20–30 generations per year

Similar to Melon aphid, spiraea aphid

Damage

Infest blossom and young growth, causing twisting and sooty mould. These aphids are the main vector of tristeza virus.

Major natural enemies

Small parasitic wasps *Aphelinus gossypii*, *Aphidius colemani*; ladybirds, e.g. *Coccinella transversalis*; lacewings; hoverfly larvae.

Action level

25% or more of flushes infested.

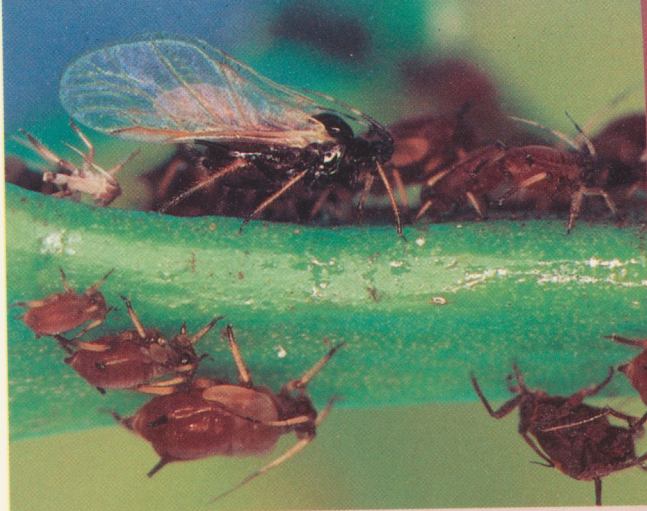
MONITORING

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Citrus aphids on shoot and flower stalk. Note the large amounts of honeydew on the largest leaf.

Transverse ladybird (*Coccinella transversalis*) feeding on aphids. Note the yellow ladybird eggs.



Citrus aphids on shoot. Note the winged female (top), and the wing buds of a last-stage nymph (lower left).



Predatory syrphid fly larva feeding on impaled aphid.

Larva of brown lacewing (*Micromus tasmaniae*), an aphid predator.

Melon aphid

Aphis gossypii

Pest size	2 mm
Importance	MINOR
Distribution	Most districts
Varieties attacked	All
Seasonal history	20–30 generations per year
Similar to	Black citrus aphids, spiraea aphid

Damage

Infests blossom and young growth, causing severe distortion and sooty mould.

Major natural enemies

Small parasitic wasps *Aphidius* sp. and *Aphelinus* sp.; ladybirds; lacewing; hoverfly larvae.

Action level

25% or more of flushes infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Spiraea aphid

Aphis spiraeicola

Pest size	2 mm
Importance	MINOR
Distribution	SE Qld, northern coastal NSW
Varieties attacked	All
Seasonal history	20–30 generations per year
Similar to	Melon aphid, black citrus aphids

Damage

Infests blossom and young growth, causing severe distortion and sooty mould.

Major natural enemies

Small parasitic wasps *Aphidius* sp. and *Aphelinus* sp.; ladybirds; lacewing; hoverfly larvae.

Action level

25% or more of flushes infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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A young citrus shoot infested with melon aphids. Note the deformed leaves caused by aphid attack



Spiraea aphids with the predatory larva of a syrphid fly (*Simosyrphus grandicornis*) (centre).



Shoot infested with spiraea aphids. Note the deformed leaves caused by aphid attack.

Citrus planthopper

Colgar peracutum

Pest size	8 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	All districts except WA
Varieties attacked	All
Seasonal history	3–6 generations per year
Similar to	Green planthopper, mango planthopper

Damage

Infests green twigs and fruit stalks, causing heavy sooty mould.

Major natural enemies

Small wasps, e.g. *Alchalcirinus* sp., parasitise the eggs.

Action level

20% or more of fruit stalks infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus planthopper (*Colgar peracutum*) on fruit stalk.



Late instar nymph of citrus planthopper.

Green planthopper

Siphanta acuta, *Siphanta hebes*

Pest size	8 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	All districts except WA
Varieties attacked	All
Seasonal history	3–6 generations per year
Similar to	Citrus planthopper, mango planthopper

Damage

Infests green twigs and fruit stalks, causing heavy sooty mould.

Major natural enemies

Small wasps, e.g. *Alchalcirinus* sp., parasitise the eggs.

Action level

20% or more of fruit stalks infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Green planthopper (*Siphanta acuta*) adult and nymphs on twig. Note the sooty mould.



Green planthopper egg mass and newly hatched nymphs.

Mango planthopper

Colgaroides acuminata

Pest size	13 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All
Seasonal history	3–6 generations per year
Similar to	Citrus planthopper, green planthopper

Damage

Infests blossom and young growth, causing severe distortion and sooty mould.

Major natural enemies

Small wasps, e.g. *Alchalcercinus* sp., parasitise the eggs.

Action level

20% or more of fruit stalks infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Passionvine hopper

Scolypopa australis

Pest size	8 mm
Importance	MINOR
Distribution	Coastal NSW, SE Qld
Varieties attacked	All, particularly oranges and mandarins
Seasonal history	More than 1 generation per year
Similar to	Citrus planthopper, green planthopper, mango planthopper

Damage

Infests twigs and fruit stalks, causing sooty mould.

Major natural enemies

Small parasitic wasps, e.g. *Centrodora scolypopae*.

Action level

20% or more of green twigs infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Mango planthopper adult (top). Below the adult are numerous, white cast skins from nymphs that have become adults. At bottom centre is the pupal case of an epipyropid moth (a parasite of mango planthopper) on a piece of excised leaf.

Mango planthopper egg masses. Top, with newly hatched nymphs; bottom, unhatched.



Passionvine hopper adult.

Citrus leafhopper (citrus jassid)

Empoasca smithi

- Pest size** 3–4 mm
- Importance** MAJOR in some areas
- Distribution** SE Qld
- Varieties attacked** Mainly Imperial mandarin, navels and grapefruit
- Seasonal history** 6 generations per year
- Similar to** No other pests

Damage

Infests young shoots and maturing fruit, causing shoot dieback and severe spotting on the fruit.

Major natural enemies

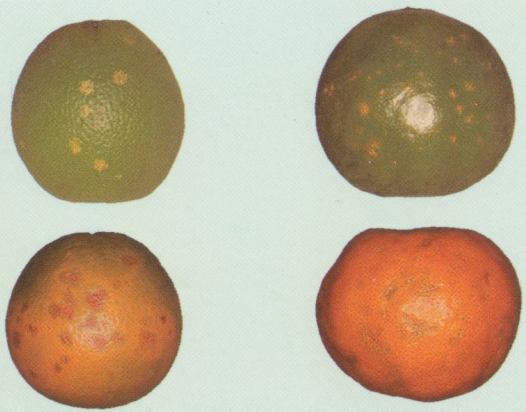
Small parasitic wasp *Anagrus* sp. attacks leafhopper eggs.

Action level

20% or more of flushes infested, or 5% or more of fruit.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Navel oranges damaged by citrus leafhopper. Top, immature fruit; bottom, mature fruit.

Imperial mandarins damaged by citrus leafhopper. Top, immature fruit; bottom, mature fruit.



Adult citrus leafhopper (also known as citrus jassid).



Last instar nymph of citrus leafhopper. Note the well-developed wing buds.

Bladder cicada

Cytosoma schmeltzi

Pest size	30–40 mm
Importance	MINOR
Distribution	Qld, northern NSW
Varieties attacked	All
Seasonal history	1 generation every 2–3 years
Similar to	No other pests

► Damage

Adults lay eggs in fruit stems and twigs, causing splitting and fruit drop.

► Major natural enemies

Not yet identified.

► Action level

If cicada numbers are high enough to cause fruit drop.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Twig showing burst tissues, caused by cicada egg laying and subsequent emergence of nymphs.



Adult bladder cicada.



Damage to shoots of a young tree caused by cicada egg laying. Leaves have dropped from affected twigs.

Australian citrus whitefly

Orchamoplatus citri

Pest size	2.5 mm
Importance	OCCASIONALLY IMPORTANT WA MINOR other states
Distribution	All districts
Varieties attacked	All
Seasonal history	4–6 generations per year
Similar to	Aleurocanthus whitefly

Damage

Infests leaves, causing sooty mould; infests underside of mature young leaves inside the tree, moving to young twigs in spring and autumn.

Major natural enemies

Small parasitic wasps *Cales noacki*, *Encarsia* sp. and *Prospaltella*; a small, predatory nitidulid beetle.

Action level

25% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Australian citrus whitefly. Note the moth-like adults, and circular egg laying pattern.

Leaf infested with Australian citrus whitefly nymphs.

Aleurocanthus whitefly

Aleurocanthus sp.

Pest size	2.5 mm
Importance	MINOR
Distribution	Qld
Varieties attacked	All
Seasonal history	6 generations per year
Similar to	Australian citrus whitefly

Damage

Infests underside of mature young leaves, inside the canopy.

Major natural enemies

Lacewings.

Action level

25% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Aleurocanthus whitefly adults (white) and nymphs (mostly black) on citrus leaf.

Black and white patterned aleurocanthus nymphs. Note the eggs at bottom right.

Spined citrus bug

Biprorulus bibax

Pest size 15–20 mm

Importance MAJOR

Distribution Qld, NSW, Vic, SA

Varieties attacked All, particularly lemons and mandarins

Seasonal history 3–4 generations per year

Similar to Green vegetable bug

Damage

Sucks the fruit causing rind damage, brown staining and gumming, and then fruit drop. Similar to damage caused by green vegetable bug.

Major natural enemies

Small parasitic wasps, e.g. *Trissolcus oenone*, parasitise the eggs; the predatory assassin bug (*Pristhesancus plagipennis*).

Action level

5–10% or more of trees infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Lisbon lemons damaged by spined citrus bug. The lemon on the top has been sliced to show internal damage.

Imperial mandarins damaged by spined citrus bug.



Spined citrus bug: adult, nymphs and eggs.



Spined citrus bug eggs parasitised by the wasp *Trissolcus* sp. Note the emerging wasp (top centre), and eggs from which wasps have emerged. The white egg with a black mark was unparasitised, and the spined citrus bug nymph has emerged.



Assassin bug preying on a spined citrus bug nymph.

Bronze orange bug

Musgraveia sulciventris

Pest size	25 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All
Seasonal history	1 generation per year
Similar to	No other pests

Damage

Sucks fruit and shoots, causing fruit drop and wilting.

Major natural enemies

The small wasp *Anastatus bipronuli* parasitises the eggs; predatory bugs.

Action level

25% or more of trees with one or more bugs present.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Green vegetable bug

Nezara viridula

Pest size	15 mm
Importance	MINOR
Distribution	Most districts
Varieties attacked	All
Seasonal history	3-4 generations per year
Similar to	Spined citrus bug

Damage

Sucks the fruit causing small dark scars and fruit drop. Similar to damage caused by spined citrus bug.

Major natural enemies

The small wasp *Trissolcus basalus* parasitises the eggs.

Action level

25% or more of trees infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult bronze orange bug feeding on shoot.



Second, third and fourth instar bronze orange bug nymphs.



Green vegetable bugs: adult (right), late instar nymph (left) and younger nymphs.



Fruit drop caused by green vegetable bug.

Citrus blossom bug

Austropeplus sp.

Pest size	5 mm
Importance	MINOR
Distribution	Coastal NSW
Varieties attacked	All
Seasonal history	At least 6 generations per year
Similar to	Rutherglen bug, grey cluster bug

Damage

Feeds on young shoots, including flowers, causing wilting.

Major natural enemies

Not yet identified.

Action level

25% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Crusader bug

Mictis profana

Pest size	20–25 mm
Importance	MINOR
Distribution	Most districts
Varieties attacked	All
Seasonal history	3–4 generations per year
Similar to	Passionvine bug

Damage

Feeds on young shoots, causing wilting.

Major natural enemies

The assassin bug (*Pristhesancus plagipennis*) is a predator; small wasps parasitise the eggs.

Action level

25% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus blossom bug.



Crusader bugs: nymph (upper left), adult female (upper right) and male feeding.

Wilted shoot caused by crusader bug feeding.

Citrus leafminer

Phyllocnistis citrella

Pest size Mature larva 3 mm long, adult moth 4 mm wingspan

Importance OCCASIONALLY IMPORTANT

Distribution All districts

Varieties attacked All

Seasonal history Up to 15 generations per year

Similar to No other pests

Damage

Twisting of young leaves.

Major natural enemies

In Qld, small wasps, mainly *Ageniaspis citricola*, but also *Semi-elacher petiolatus* and *Cirrospilus quadristriatus*; in other states mainly *S. petiolatus*.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Second and third instar larvae of citrus leafminer.

Autumn leaf flush damaged by citrus leafminer.



Close-up of citrus leafminer damage. Note the curling and distortion of leaves, the mines with their dark excrement trail, the larva within a mine (lower left), and brown pupae within folds near the edges of the leaves.



The wasp *Semi-elacher petiolatus*, a parasite of citrus leafminer: bottom, pupa; top, adult.

Lightbrown apple moth

Epiphyas postvittana

Pest size Mature larva 18 mm long, adult moth 18 mm wingspan

Importance **MAJOR** Riverland
OCCASIONALLY IMPORTANT other districts

Distribution NSW, Vic, SA

Varieties attacked All, particularly oranges

Seasonal history 3–4 generations per year

Similar to Larva similar to citrus rindborer

Damage

Larvae feed on the flowers and under the fruit calyxes causing fruit drop and a 'halo' scar in growing fruit; some damage can occur in mature fruit.

Similar to damage caused by megalurothrips and scirtothrips.

Major natural enemies

Small wasps, e.g. *Trichogramma*, parasitise the eggs; several small braconid wasps parasitise the caterpillars; the bug *Oechia schellenbergii* is a predator.

Action level

5% or more of flowers or fruitlets or fruit of navel oranges infested, 10% or more on other varieties.

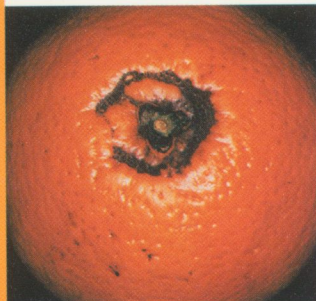
MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Young fruit

J	J	A	S	O	N	D	J	F	M	A	M
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Mature fruit



Characteristic circular scarring (halo damage) around the fruit calyx, caused by larvae of lightbrown apple moth. The scar is the result of larval feeding on the fruit when it was at a much younger stage. Sooty mould has darkened the scar.



Larva of lightbrown apple moth feeding beneath the calyx. Larvae often move onto fruit from leaves that are touching the fruit. Note the webbing in the young leaf at right.



Adult female lightbrown apple moth.



Egg mass of lightbrown apple moth. Note how the eggs overlap, resembling fish scales.

Orange fruitborer

Isotenes miserana

Pest size

Mature larva 18 mm long, adult moth wingspan 15 mm

Importance

MINOR

Distribution

Qld, coastal NSW, Riverina

Varieties attacked

All, particularly navels and lemons

Seasonal history

5–6 generations per year

Similar to

Larva similar to sorghum head caterpillar

Damage

Larvae bore into the rind or eat out a cavity between touching fruit; drop is caused in both green and mature fruit; gum is exuded.

Similar to damage caused by citrus rindborer and other fruitborers.

Major natural enemies

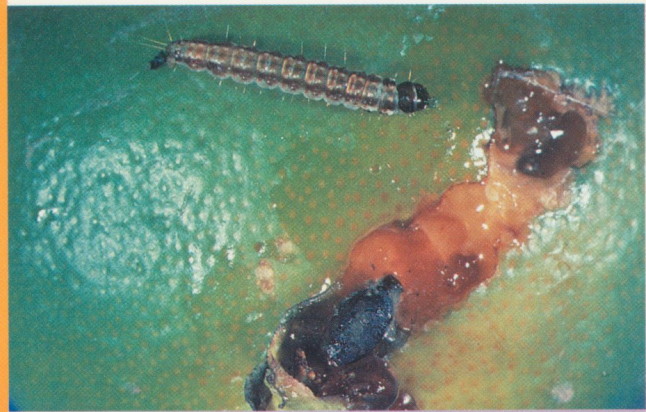
The parasitic ichneumonid wasp *Phytodietus* sp.

Action level

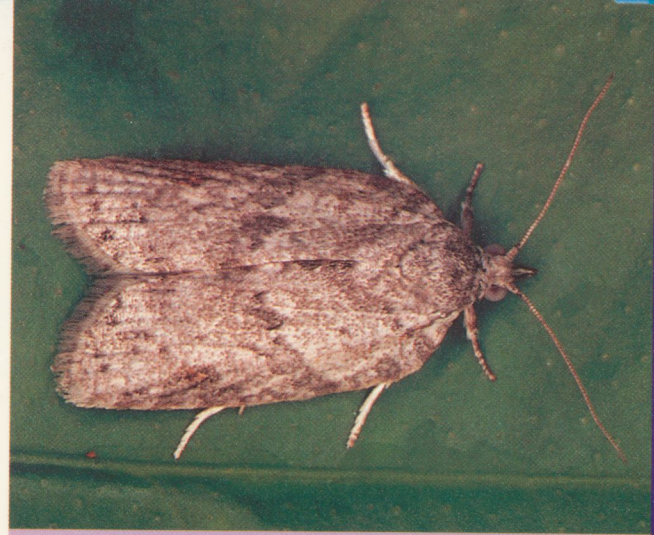
5% or more of fruit infested on the tree, 10% or more of fallen fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Orange fruitborer larva and the damage it has caused by feeding on fruit. Larvae often feed in the sheltered area between fruit that are touching.



Orange fruitborer moth.



Orange fruitborer larva.

Citrus rindborer

Adoxophyes sp.

Pest size Mature larva 12 mm long, adult moth wingspan 10 mm

Importance MINOR

Distribution Qld

Varieties attacked All, particularly Imperial mandarin

Seasonal history At least 6 generations per year

Similar to Larva similar to that of lightbrown apple moth

Damage

Larvae feed on young foliage and bore into fruit where they are touched by leaves; gum is exuded.

Similar to damage caused by other fruitborers.

Major natural enemies

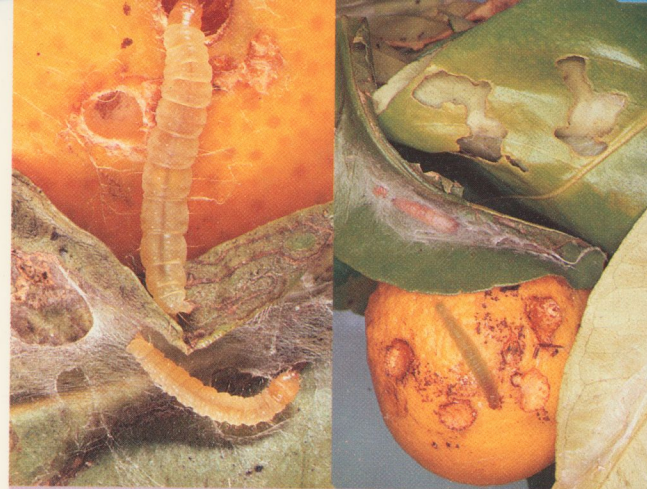
Not yet identified.

Action level

5% or more of fruit infested on the tree, 10% or more of fallen fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus rindborer caterpillar and damage caused to fruit. Note the webbing on the leaf, and the round hole in the fruit.

Leaves and fruit damaged by citrus rindborer. Note the holes eaten in the leaves, and the webbing which ties the leaves together. There is a brown pupa in the webbing and a larva on the fruit (bottom).

Sorghum head caterpillar

Cryptoblabes adoceta

Pest size Mature larva 7 mm long, adult moth wingspan 10 mm

Importance MINOR

Distribution Qld, coastal NSW

Varieties attacked Oranges, particularly early Joppa and Siletta

Seasonal history At least 6 generations per year

Similar to Larva similar to orange fruitborer

Damage

Larvae feed between touching fruit in the autumn, causing a shallow gouge and fruit drop. Similar to damage caused by other fruitborers.

Major natural enemies

Parasites which have not yet been identified.

Action level

5% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Larva of sorghum head caterpillar feeding between navel oranges. Note the black faecal pellets beside the larva, the fine webbing over the fruit surface, and the damage to the fruit.

Sorghum head caterpillar feeding between Meyer lemons.

Blastobasis fruitborers

Blastobasis spp.

- Pest size** Mature larvae 12 mm long, adult moths wingspan 10 mm
- Importance** OCCASIONALLY IMPORTANT Riverland
MINOR other districts
- Distribution** Qld, NSW, SA, Vic
- Varieties attacked** All, but navel oranges preferred
- Seasonal history** At least 6 generations per year
- Similar to** Larvae similar to larva of yellow peach moth

Damage

Larvae bore through the rind into the pulp; the point of entry may be the navel-end or through the side of the fruit. Similar to damage caused by other fruitborers.

Major natural enemies

Not yet identified.

Action level

5% or more of fruit on tree infested,
10% or more of fallen fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Yellow peach moth

Conogethes punctiferalis

- Pest size** Mature larva 15 mm long, adult moth wingspan 25 mm
- Importance** MINOR
- Distribution** Qld, NSW, Vic, SA
- Varieties attacked** Mainly oranges, particularly navel and Joppa
- Seasonal history** At least 6 generations per year
- Similar to** Larva similar to those of *Blastobasis* spp.

Damage

Larvae bore deeply into maturing fruit in autumn. Similar to damage caused by other fruitborers.

Major natural enemies

The tachinid fly, *Argyrophylax proclinata*.

Action level

5% or more of fruit on the tree infested, 10% of fallen fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Larva of *Blastobasis* sp. and damage caused to navel orange. The entry hole can be seen on the rind on the left. The rind has been cut to reveal the feeding larva and its sago-like frass (right).



Larva of yellow peach moth and damage caused to navel orange. Note the feeding tube (opened to reveal the larva) made of frass webbed together.

Fruitpiercing moths

Othreis fullonia, *Othreis materna*, *Eudocima salaminia*

Pest size

Up to 100 mm wingspan

Importance

MAJOR

Distribution

Qld, coastal NSW

Varieties attacked

All, particularly early maturing varieties, e.g. navels, grapefruit and Imperial mandarin

Seasonal history

2–4 generations per year

Similar to

No other pests

Damage

The adult moths pierce and suck ripening fruit at night mainly in March–April, causing fruit drop.

Major natural enemies

Several wasp egg parasites: *Trichogramma* spp., *Telenomus* spp. and *Ooencyrtus* spp.

Action level

5 % or more of fruit affected.

MONITORING

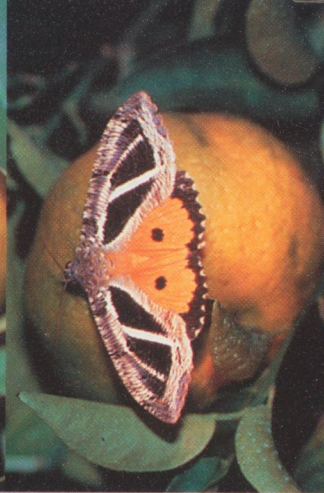
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Navel orange damaged by fruitpiercing moths. Note the numerous feeding punctures with associated white sugarine crystals, and discolouration caused by secondary rots.



Fruitpiercing moth (*Othreis fullonia*) feeding on an orange. Note the large size of the moth, the brown forewings, and orange hindwings with dark patches.



Female fruitpiercing moth (*Othreis materna*) feeding on an orange. Males of this species have brown forewings. Both sexes have a prominent black spot in the centre of each hindwing.



Fruitpiercing moth (*Eudocima salaminia*) feeding on an orange. Note the characteristic forewing pattern of this species, which mimics a curled leaf.



Fruitpiercing moth (*Othreis fullonia*) resting on a damaged Imperial mandarin. (The forewings of this moth have lost their decorative scales.)

Lemon bud moth and citrus flower moth

Prays parilis, *Prays nephelomima*

Pest size Mature larvae 10 mm long, adult moths wingspan 12 mm

Importance **MINOR**

Distribution Qld, coastal NSW

Varieties attacked All, but particularly lemons

Seasonal history 6–7 generations per year

Similar to Larvae similar to larva of lightbrown apple moth

Damage

Larvae web and eat the flowers and young, newly set fruit, especially fruit set in autumn.

Major natural enemies

Small wasps parasitise the caterpillars.

Action level

50% or more of flowering shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Larva of citrus flower moth on lemon flower. There is also a pupa within a silken cocoon to the left of the larva.



Lemon bud moth: mature larva (right) near feeding hole on lemon bud; pupa within silken mesh cocoon (left). Buds are webbed together with silk. Note the larval frass amongst the buds.



Lemon bud moth.

Citrus flower moth and pupa in silken cocoon (bottom).

Corn earworm and native budworm

Helicoverpa armigera, *Helicoverpa punctigera*

Pest size Mature larvae 45–50 mm long, adult moths wingspan 45 mm

Importance **MINOR**

Distribution Qld, NSW, NT

Varieties attacked All

Seasonal history Up to 10 generations per year in warm areas, less in cooler areas

Similar to Banana fruit caterpillar

► Damage

Larvae feed on flowers and newly set fruit, causing flower and fruit drop.

Similar to damage caused by banana fruit caterpillar.

► Major natural enemies

Small egg parasites *Trichogramma* spp.; larval parasite *Micropolitis demolitor*; predatory bugs; predatory beetles; lacewings.

► Action level

25% or more of flowering shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Corn earworm larva feeding on young fruit.



Mature corn earworm larva on young shoot.

Citrus leafroller

Psorosticha zizyphi

- Pest size** Mature larva 10 mm long, adult moth wingspan 12 mm
- Importance** **MINOR**
- Distribution** SE Qld
- Varieties attacked** All, particularly lemons
- Seasonal history** 10 generations per year
- Similar to** Larva similar to that of citrus rindborer

Damage

Larvae roll up young leaves and feed on them.

Major natural enemies

A small ichneumonid wasp parasitises the caterpillars. Assassin bug (*Pristhesancus plagipennis*) is a predator.

Action level

50% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Banana fruit caterpillar

Tiracola plagiata

- Pest size** Mature larva 60 mm long, adult moth 50 mm wingspan
- Importance** **MINOR**
- Distribution** Qld, coastal NSW
- Varieties attacked** All
- Seasonal history** 3–4 generations per year
- Similar to** Larva similar to that of corn earworm

Damage

Larvae feed on the newly set fruit, causing fruit drop.

Major natural enemies

Tachinid flies and ichneumonid wasps parasitise the larvae; predatory bugs.

Action level

25% or more of shoots infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Young citrus leafroller larva beneath silken webbing. Later stage larvae roll young leaves lengthwise.

Damage to young leaves caused by citrus leafroller. (There is also citrus leafminer damage on the lower leaves.)



Banana fruit caterpillars feeding on young citrus fruit.

Citrus butterflies

Eleppone anactus (small), *Princeps aegeus* (large)

Pest size

Small citrus butterfly: mature larva 50 mm long, adult 75 mm wingspan
Large citrus butterfly: mature larva 70 mm long, adult 130 mm wingspan

Importance

MINOR

Distribution

All districts

Varieties attacked

All

Seasonal history

At least 3 generations per year

Similar to

No other pests

Damage

Larvae feed on the young growth.
Similar to damage caused by grasshoppers and crickets.

Major natural enemies

Small wasps and tachinid flies are important parasites of the larvae.

Action level

25% or more of shoots of young trees infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Three different-sized larvae of the large citrus butterfly (left), showing the colour change that occurs during growth, and three different-sized larvae of the small citrus butterfly (right).



Small citrus butterfly adult, with larvae and pupa. This species is more common than the large citrus butterfly in southern Australia.



Male (top) and female large citrus butterflies.

Fuller's rose weevil

Asynonychus cervinus

Pest size	8 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	All districts
Varieties attacked	All
Seasonal history	1–2 generations per year
Similar to	Apple weevil, citrus fruit weevil

Damage

Adults chew the leaves to produce a serrated edge; eggs are laid under the calyx of the fruit, causing a problem in fruit for export.

Major natural enemies

The small wasp *Fidiobia citri* parasitises the eggs.

Action level

Nil tolerance for egg masses on fruit for export to Japan.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus leafeating weevil

Eutinophaea bicristata

Pest size	3 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	SE Qld
Varieties attacked	All
Seasonal history	1 generation per year
Similar to	Spinelegged citrus weevil

Damage

Irregular-shaped patches chewed out of both leaf surfaces, especially on the bottom third of the tree.

Major natural enemies

Not yet identified.

Action level

5 or more beetles per small branch.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Fuller's rose weevil on fruit



Eggs of Fuller's rose weevil under a fruit calyx. At left, a newly hatched larva and, at right, the wasp parasite *Fidiobia citri*.



Mating citrus leafeating weevils. Note the two ridges on the male's back.

Leaf damage caused by citrus leafeating weevils. Yellow areas show where the tissues have been eaten

Elephant weevil

Orthorhinus cylindrirostris

Pest size 20 mm

Importance **MINOR**

Distribution All districts except WA

Varieties attacked All, particularly lemons

Seasonal history 1 generation per year

Similar to No other pests

Damage

Larvae tunnel in the trunk and wood roots; adults cause slight damage by feeding on the green bark of twigs.

Similar to damage caused by longicorn beetles.

Major natural enemies

Not yet identified.

Action level

Visibly affected trees.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus fruit weevil

Neomerimnetes sobrinus

Pest size 7 mm

Importance **MINOR**

Distribution SE Qld

Varieties attacked All, but particularly oranges

Seasonal history 1 generation per year

Similar to Fuller's rose weevil

Damage

Adults feed on the newly set fruit in October, causing fruit drop.

Similar to damage caused by corn earworm and banana fruit caterpillar.

Major natural enemies

Not yet identified.

Action level

10% or more of fruit freshly damaged.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult elephant weevil.

Twigs damaged by adult elephant weevil.



Citrus fruit weevil feeding on young fruit.

Spinelegged citrus weevil

Maleuterpes spinipes

Pest size	3 mm
Importance	MINOR
Distribution	Coastal NSW
Varieties attacked	All
Seasonal history	1–2 generations per year
Similar to	Citrus leafeating weevil

Damage

Adults cause rind scarring on young fruit and saw-toothed damage to leaf margins.

Major natural enemies

Not yet identified.

Action level

10% or more of fruit freshly damaged, or 25% of foliage.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Apple weevil

Otiorhynchus cribricollis

Pest size	9 mm
Importance	MINOR
Distribution	Coastal NSW
Varieties attacked	All
Seasonal history	1–2 generations per year
Similar to	Fuller's rose weevil

Damage

Adults feed on foliage at night, defoliating young trees.

Major natural enemies

Not yet identified.

Action level

25% or more of foliage damaged.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult spinelegged citrus weevil (also known as dicky rice weevil).



Damage to Valencia oranges caused by spinelegged citrus weevil.



Adult apple weevil.

Citrus branch borer

Uracanthus cryptophagus

Pest size	Adult 40 mm, mature larva 40 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All, particularly oranges
Seasonal history	1 generation per year
Similar to	Larva similar to that of other longicorns

Damage

Larvae tunnel in the branches, eventually ringbarking and killing them.

Similar to damage caused by *pittosporum longicorn*.

Major natural enemies

Not yet identified.

Action level

First signs of branch wilting.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Pittosporum longicorn

Strongylurus thoracicus

Pest size	Adult 30 mm, mature larva 40 mm
Importance	MINOR
Distribution	Qld, coastal NSW
Varieties attacked	All
Seasonal history	1 generation per year
Similar to	Larva similar to those of other longicorns

Damage

Larvae tunnel in the twigs and small branches.

Similar to damage caused by citrus branch borer.

Major natural enemies

Not yet identified.

Action level

First signs of attack.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult and larva of citrus branch borer, and larval gallery filled with frass.

Wilted Valencia orange branch, caused by citrus branch borer. Note the proximity of the orange trees to native forest.



Pittosporum longicorn.

Fig longicorn

Acalolepta vastator

Pest size

Adult 30 mm, mature larva 40 mm

Importance

MINOR

Distribution

Qld, coastal NSW

Varieties attacked

Particularly Tahitian limes

Seasonal history

1 generation per year

Similar to

Larva similar to those of other longicorns

Damage

Larvae tunnel under the bark of the trunk and lower main limbs, producing heavy frass which drops to the ground. Similar to damage caused by speckled longicorn.

Major natural enemies

Not yet identified.

Action level

Damage rating of 2 (noticeable patches on trunk and a main limb).

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Severe damage to the lower trunk of a Tahitian lime caused by fig longicorn. Note the frass beneath the tree.

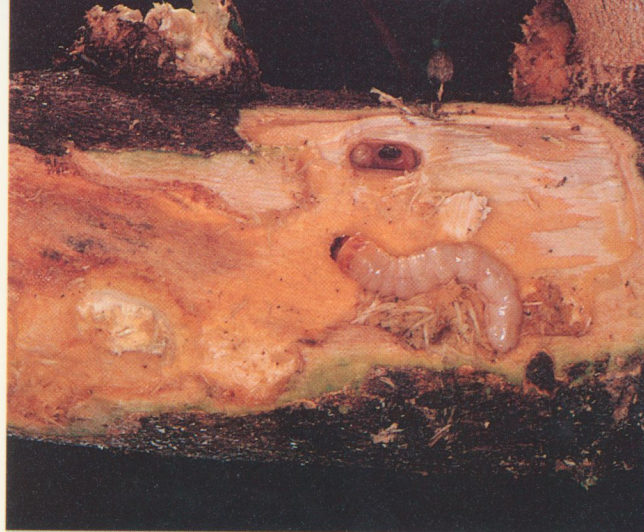


Fig longicorn larvae and damage to a Tahitian lime. The bark has been removed to reveal the larvae, their feeding galleries and frass.



Fig longicorn adult resting near its emergence hole.

Speckled longicorn

Paradisterna plumifera

Pest size

Adult 12 mm, larva 30 mm

Importance

MINOR

Distribution

Qld, coastal NSW

Varieties attacked

All, particularly older navel

Seasonal history

1 generation per year

Similar to

Larva similar to those of other longicorns

Damage

Larvae tunnel beneath the bark of trunk and lower main limbs, producing frass which drops to the ground.

Similar to damage caused by fig longicorn.

Major natural enemies

Not yet identified.

Action level

Damage rating of 2 (noticeable patches on trunk and a main limb).

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Citrus longicorn

Skeletodes tetrops

Pest size

Adult 12 mm, larva 20 mm

Importance

MINOR

Distribution

Qld, coastal NSW

Varieties attacked

All, particularly older, less vigorous trees

Seasonal history

1 generation per year

Similar to

Larva similar to those of other longicorns

Damage

Larvae tunnel beneath the bark of trunk and lower main limbs, producing frass which drops to the ground.

Similar to damage caused by speckled longicorn.

Major natural enemies

Not yet identified.

Action level

Damage rating of 2 (noticeable patches on trunk and a main limb).

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Speckled longicorn.

Damage caused by speckled longicorn to the lower trunk of a navel orange tree.



Citrus longicorn.

Monolepta beetle

Monolepta australis

Pest size	6 mm
Importance	MINOR
Distribution	Qld, coastal NSW, NT
Varieties attacked	All
Seasonal history	3–4 generations per year
Similar to	No other pests

► Damage

Swarms of adults destroy flowers and young growth. Similar to damage caused by rhyparida beetle.

► Major natural enemies

The tachinid fly *Monoleptophaga caldwelli* parasitises adults.

► Action level

Swarms on the trees.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Rhyparida beetle

Rhyparida spp.

Pest size	7 mm
Importance	MINOR
Distribution	North Qld, NT
Varieties attacked	All
Seasonal history	3–4 generations per year
Similar to	No other pests

► Damage

Swarms of adults destroy flowers and young growth. Similar to damage caused by monolepta beetle.

► Major natural enemies

Not yet identified.

► Action level

Swarms on the trees.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Monolepta beetle feeding on a citrus flower bud.

Monolepta beetles and the damage they have caused to leaves and buds.



Rhyparida beetle.

Damage caused to pummelo leaves by *rhyparida* beetle.

Katydidids

Caedicia spp., *Caedicia simplex*, *Ephippitytha tringitiduoguttata*

Pest size

Adult 40–50 mm

Importance

OCCASIONALLY IMPORTANT

Distribution

Most districts

Varieties attacked

All, but particularly navels

Seasonal history

1 generation per year

Similar to

Other katydidids

Damage

Nymphs and adults bite pieces out of the young fruit, causing a large chalky-white scar and fruit drop.

Major natural enemies

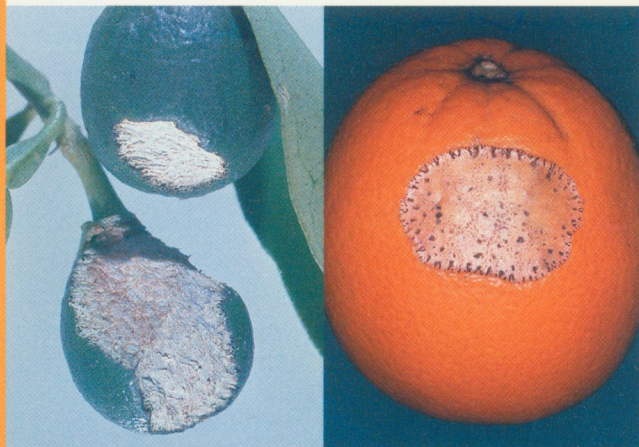
A tachinid fly, and wasp parasites.

Action level

5% or more of fruit with fresh damage.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Damage to young navel oranges caused by citrus katydid. Deep gouges have been made in the fruit, and large amounts eaten.

Scar on a mature navel orange caused by katydid feeding. The original damage was done when the fruit was very young.



Katydid on lemon blossom. Note the damage to the stigma and style of the young fruit (near the katydid's hind leg).



Adult inland katydid.

Inland katydid nymph.

Citrus leafeating cricket

Tamborina australis

Pest size	Adult 35–40 mm
Importance	MINOR
Distribution	SE Qld
Varieties attacked	All, particularly navel oranges, Murcott and Imperial mandarins
Seasonal history	4–5 generations per year
Similar to	Grasshoppers

Damage

Adults and nymphs feed on the young leaves mostly at night, chewing holes and causing browning and curling. Similar to damage caused by grasshoppers.

Major natural enemies

Not yet identified.

Action level

25% or more of shoots showing fresh damage.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Giant grasshopper

Valanga irregularis

Pest size	Up to 90 mm
Importance	MINOR
Distribution	Qld, NSW
Varieties attacked	All
Seasonal history	1 generation per year
Similar to	No other pests

Damage

Nymphs and adults chew the leaves, with some damage to young fruit. Similar to damage caused by crickets.

Major natural enemies

The small wasp egg parasite *Scelio flavicomis*.

Action level

25% or more of young shoots damaged.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Male leafeating cricket (top), female (bottom). The male uses his strongly veined forewings to make chirping sounds that attract females.

Two types of damage caused by leafeating cricket: chewing through leaf blades and chewing holes in the leaf margins (left); and grazing on the leaf surface, which results in browning and leaf curling (right).



Adult giant grasshopper.

Giant grasshopper nymph. Note the large holes chewed out of the edges of the leaves.

Queensland fruit fly

Bactrocera tryoni

Pest size

Adult 7 mm, mature larva 9 mm

Importance

MAJOR

Distribution

Qld, coastal NSW

Varieties attacked

All, particularly Meyer lemons and grapefruit

Seasonal history

4-6 generations per year

Similar to

Other fruit flies

Damage

Larvae feed on the pulp, destroying ripened and maturing fruit.

Similar to damage caused by other fruit flies.

Major natural enemies

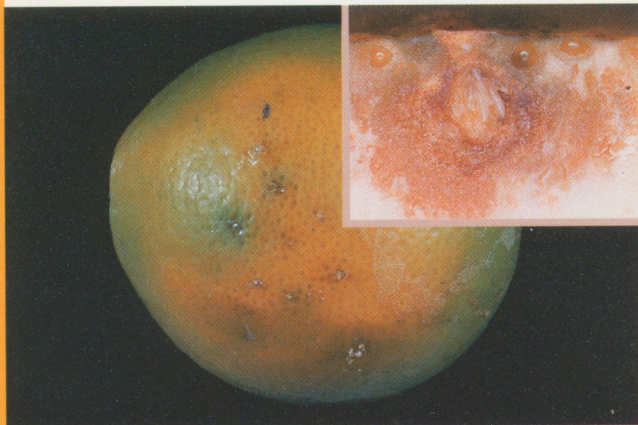
Small braconid wasps parasitise the larvae.

Action level

Start baiting at least one month before fruit reach the stage where they are susceptible to attack.

MONITORING

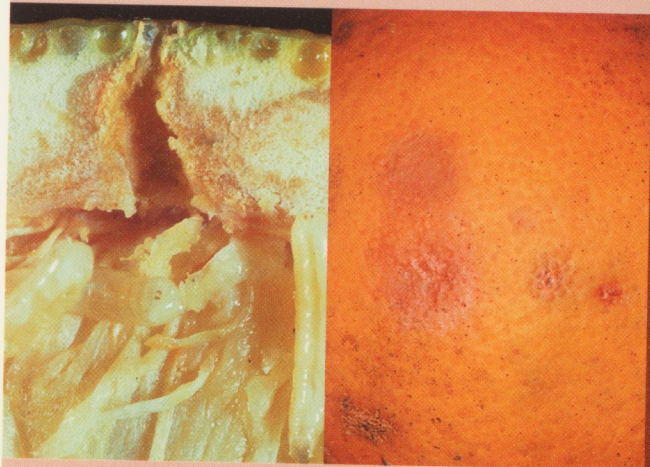
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Queensland fruit fly 'stings' on green mature Meyer lemon. A clear gum has exuded from the stings, and the rind around them has yellowed. Inset, a cross-section through the rind at a sting site shows the eggs deposited beneath the rind.



Female Queensland fruit fly.



Queensland fruit fly larvae in pulp of fruit.

Queensland fruit fly 'stings' on mature navel orange. Rots are developing around the egg-laying sites.

Mediterranean fruit fly

Ceratitis capitata

Pest size	Adult 4–5 mm, larva 8 mm
Importance	MAJOR
Distribution	WA
Varieties attacked	All, particularly mandarins and oranges
Seasonal history	4–5 generations per year
Similar to	Other fruit flies

Damage

Larvae tunnel in the pulp destroying the fruit.
Similar to damage caused by other fruit flies.

Major natural enemies

Not yet identified.

Action level

Start baiting at least 6 weeks before fruit reach the stage where they are susceptible to attack.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Papaya fruit fly

Bactrocera papayae

Pest size	Adult 7 mm, mature larva 9 mm
Importance	MINOR, but potentially MAJOR
Distribution	North Qld
Varieties attacked	All
Seasonal history	At least 6 generations per year
Similar to	Other fruit flies

Damage

Larvae tunnel in the pulp destroying the fruit.
Similar to damage caused by other fruit flies.

Major natural enemies

Small braconid wasps parasitise the larvae.

Action level

Start baiting at least 6 weeks before fruit reach the stage where they are susceptible to attack.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult Mediterranean fruit fly (medfly).



Adult papaya fruit fly.

Citrus blossom midge

Cecidomya sp.

Pest size	Adult 2 mm, mature larva 2–3 mm
Importance	MINOR
Distribution	Coastal SE Qld
Varieties attacked	All, particularly lemons
Seasonal history	At least 12 generations per year
Similar to	No other pests

► Damage

Larvae feed on flower buds, destroying them.

► Major natural enemies

Not yet identified.

► Action level

50% or more of flower buds infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult male citrus blossom midge. This midge is resting on a swollen flower bud containing midge larvae.



Swollen flower bud dissected to reveal numerous translucent larvae of citrus blossom midge.



Swollen flower bud (right) infested with citrus blossom midge larvae. There are three normal buds on the left.

Citrus gall wasp

Bruchophagus fells

Pest size	Adult 2.5 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	Qld, north coastal NSW
Varieties attacked	All, particularly grapefruit
Seasonal history	1 generation per year
Similar to	No other pests

Damage

Larvae feed under the bark, causing large galls in the twigs.

Major natural enemies

Two small parasitic wasps
Megastigmus brevipalvus and
Megastigmus trisulcus.

Action level

33% or more of branches seriously infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Galls formed on grapefruit twigs as a result of attack by citrus gall wasp. Note the small holes through which adults have emerged.



Female citrus gall wasp laying eggs into a young twig.



Female wasp *Megastigmus brevipalvus* parasitising gall wasp eggs in a twig. Note the thin ovipositor inserted into the twig.



Gall wasp parasite *Megastigmus brevipalvus* laying eggs into the eggs of citrus gall wasp in a twig. The extensive brown stippling on the twig is caused by large numbers of citrus gall wasps laying eggs.

Paper wasps

Polistes humilis synoecus, *Polistes dominulus*, *Polistes tepidus*

Pest size	15–25 mm
Importance	MINOR
Distribution	Most districts
Varieties attacked	All
Seasonal history	Several generations per year
Similar to	No other pests

► Damage

No damage to the tree, but can cause problems by stinging pruners and pickers.

► Major natural enemies

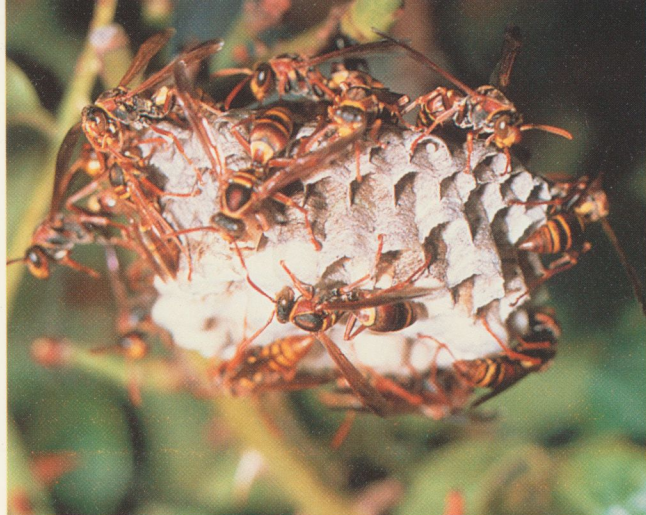
Not yet identified.

► Action level

Destroy wasps as they are located.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Nest of the common paper wasp.



Nest of an unidentified species of paper wasp in a Queensland citrus tree.

Scirtothrips

Scirtothrips albomaculatus

Pest size

1.5 mm

Importance

OCCASIONALLY IMPORTANT

Distribution

Qld

Varieties attacked

Most, particularly navels

Seasonal history

At least 6 generations per year

Similar to

Other thrips

Damage

Feed on young tissue, particularly near the calyx, producing a circular stem-end scar (halo). Similar to damage caused by lightbrown apple moth and megalurothrips.

Major natural enemies

Predatory thrips.

Action level

5% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Megalurothrips

Megalurothrips kellyanus

Pest size

2–3 mm

Importance

MAJOR Riverland
OCCASIONALLY IMPORTANT other districts

Distribution

NSW, Vic, SA

Varieties attacked

All, but particularly lemons

Seasonal history

At least 6 generations per year

Similar to

Other thrips

Damage

Feed on young tissue, particularly near the calyx, producing a circular stem-end scar (halo). Similar to damage caused by lightbrown apple moth and scirtothrips.

Major natural enemies

Predatory thrips.

Action level

5% or more of young fruit infested, 10% or more of maturing fruit.

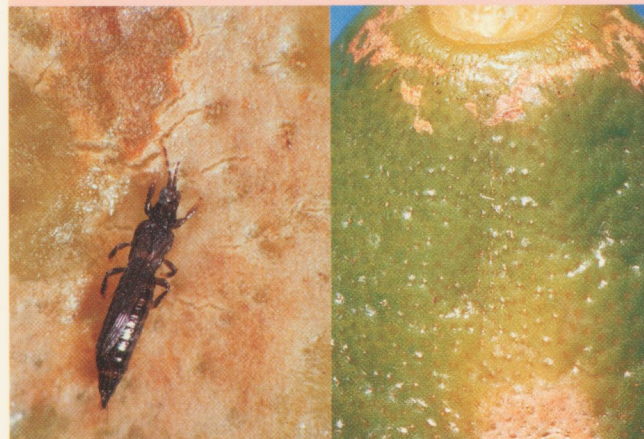
MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Adult scirtothrips. Note the feathery wings folded along the back.

Ring scarring around the stem end of a navel orange caused by *Scirtothrips dorsalis*.



Adult megalurothrips and rind scarring on lemon.

Blemish on stem end and side of lemon caused by megalurothrips.

Citrus rust thrips (orchid thrips)

Chaetanaphothrips orchidii

Pest size	1.5 mm
Importance	OCCASIONALLY IMPORTANT
Distribution	Qld, coastal NSW
Varieties attacked	All, particularly navels, grapefruits, and Siletta orange
Seasonal history	Several generations per year
Similar to	Other thrips

Damage

Circular rust marks between touching fruit and where a leaf touches a fruit.
Similar to damage caused by brown citrus rust mite.

Major natural enemies

Predatory thrips.

Action level

10% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Plague thrips

Thrips imaginis

Pest size	1.2 mm
Importance	MINOR
Distribution	Coastal NSW, SE Qld
Varieties attacked	All
Seasonal history	At least 12 generations per year
Similar to	Other thrips

Damage

Slight damage to flower petals and blistering of young leaves.

Major natural enemies

Not yet identified.

Action level

No action required.

MONITORING

Monitoring not usually required.



Adult citrus rust thrips. Note the feathery wings with dark spots at the base, folded along the back.

Characteristic brown marks on Siletta oranges made by citrus rust thrips. Damage is usually between touching fruit (top), but occasionally at the stem end of fruit (bottom).



Plague thrips feeding in a citrus flower.

Chlorotic spots caused by plague thrips on young mandarin leaves.

Greenhouse thrips

Heliothrips haemorrhoidalis

Pest size 1.5 mm

Importance OCCASIONALLY IMPORTANT

Distribution NSW, WA

Varieties attacked Mainly Valencia orange

Seasonal history At least 6 generations per year

Similar to Other thrips

Damage

Thrips feed between touching fruit or leaves, causing grey patches speckled with excreta. Similar to damage caused by citrus rust mite.

Major natural enemies

Small parasitic wasps *Thripobius semiluteus* and *Megaphragma mymaripenne*.

Action level

10% or more of fruit infested.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Damage to two mature Valencia oranges caused by greenhouse thrips. The raised scarring is on the areas of rind that were touching on the tree.



Greenhouse thrips: left, adult; right, pupa.



Adult and larval greenhouse thrips with inky excrement held at the tip of the abdomen. There is also excrement, some coalesced into large drops, on the leaf surface.

Grey scarring of leaves caused by greenhouse thrips. Note the numerous black spots of thrips excreta.

Giant northern termite

Mastotermes darwiniensis

Pest size Workers 15 mm, reproductives 20 mm

Importance **MINOR**

Distribution North Qld, WA, NT

Varieties attacked All

Seasonal history The termites are reproductively active all the year round

Similar to Other, less important termites

► Damage

Colonies invade trees up through the root and trunk, quickly destroying the tree.

► Major natural enemies

Not yet identified.

► Action level

As soon as detected.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Giant northern termites tunnelling in the trunk of a citrus tree. These termites belong to the worker caste.



Citrus tree affected by giant northern termite. Note the gallery on the trunk.

Brown house spider (webbing spider)

Badumna longinqua

Pest size	12–15 mm
Importance	MINOR
Distribution	Most districts
Varieties attacked	All
Seasonal history	1 generation in 1–2 years
Similar to	Other spiders

Damage

There is no damage to the tree, but heavy webbing is very annoying to pruners and pickers.

Major natural enemies

Not yet identified.

Action level

Excessive webbing.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Common garden snail

Helix aspersa

Pest size	25 mm
Importance	OCCASIONALLY IMPORTANT SA, NSW MINOR other states
Distribution	NSW, Vic, SA, WA
Varieties attacked	All
Seasonal history	1 generation per year
Similar to	Other snails

Damage

Feeds on leaves at night, causing holes and marks on fruit.

Major natural enemies

Some birds; lizards; sciomyzid flies.

Action level

A history of infestation.

MONITORING

J	J	A	S	O	N	D	J	F	M	A	M
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Webs of the brown house spider in a citrus tree.



Common garden snail (*Helix aspersa*).
Shell diameter is up to 30 mm.



Common garden snail and damage to leaves.

Index

This index contains references to the scientific and common names of citrus pests and their natural enemies.

As the text on each pest includes the same kind of information under the same subheadings, topics such as 'Damage' and 'Natural enemies' are not included in the index. They are easily found by referring to the main section on each pest.

In the index, the reference to the beginning of the main section on each pest is given in **bold** type. There is always a photograph of the pest on the next page. References to photographs of natural enemies of citrus pests are given in **bold italic**.

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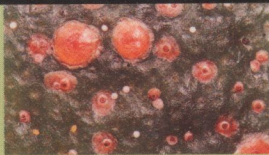
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Citrus pests

a field guide

Based on the research and experience of scientists, horticultural advisers and citrus growers, this field guide gives information on over 90 citrus pests. Over 200 colour photographs help the reader to identify the pests, the damage they cause, and some of their major natural enemies.

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